

### **REMARKS**

Claims 1-18 are presently pending and stand substantively rejected. In this Amendment, claims 1, 17, and 18 are amended, claim 16 is canceled, and new claim 19 is added. Reconsideration of the claims is respectfully requested.

#### **Support for Claim Amendments and New Claims**

Support for the amendments to claims 1 and 18 can be found in the originally filed disclosure at, for example, Fig. 1 and paragraph [0035]. Claim 17 is amended to conform the antecedent basis. Support for new claim 19 can be found in the originally filed disclosure at, for example, Figs. 4 and 9, and paragraph [0069]. No new matter is introduced.

#### **Claim Rejections - 35 USC §112**

Claim 16 is rejected under 35 USC §112, first paragraph, as allegedly failing to comply with the written description requirement. Claim 16 has been canceled. Withdrawal of this rejection is requested.

#### **Claim Rejection Under 35 USC §102**

Claims 1, 13, 14 and 18 are rejected under 35 USC §102(e) as allegedly anticipated by U.S. Patent Publication No. 2006/0107995 ["Kovacik"]. This rejection is traversed.

MPEP 2131 requires that to anticipate a claim, a reference must teach each and every element of the claim. Kovacik does not meet this test.

#### **Kovacik is not shown to disclose internal expansion step**

Amended independent claims 1 and 18 are drawn to a micro TPV generator that includes, among other things, a combustion chamber comprising "... an internal chamber where combustion occurs, the internal chamber having an internal expansion step...". Kovacik does not teach or suggest this combination of elements.

Advantageously, the presence of an internal expansion step in an internal chamber where combustion occurs generates a significantly even temperature distribution on an outer wall of the

combustion chamber. Having the internal expansion step causes combustion to occur in a manner to provide the even temperature distribution.

In contrast, the Kovacik document does not describe an expansion step that is configured to generate a significantly even temperature distribution on an outer wall of the combustion chamber. Further, Kovacik does not describe an expansion step that is internal to the combustion chamber. The "step" in Figure 3 of Kovacik indicated by the examiner simply cannot achieve the end effect of the expansion step recited in amended claims 1 and 18.

More particularly, the internal expansion step defined in amended claims 1 and 18 in the internal chamber causes flow separation and reattachment to significantly enhance the mixing process and prolong the residential time of fuel mixing. As a result, the combustion takes place near the wall at the very early stage. The fuel-air mixture around the centre line of the internal chamber is then heated and accelerated by the surrounding combustion products and flows quickly toward the end of the SiC tube and combusts there. This in turn heats the gas near the wall, resulting in a uniform temperature distribution along the wall of the micro combustor. This stabilises combustion in the burner.

The expansion step of amended claims 1 and 18 also helps to prevent the flowing back of the flame to the connection tube because of the higher velocity in the smaller connection tube, and enables combustion to work steadily under a much wider flowrate and H<sub>2</sub>/air ratio.

The examiner has objected that Kovacik defines an expansion step as indicated in Figure 3 of that publication. Applicant disagrees that the Kovacik publication discloses this feature.

The "step" feature in Figure 3 of the Kovacik publication referred to by the Examiner is not an expansion step and does not achieve end result defined in the amended claims, nor the other advantages of the expansion step mentioned above.

The "step" feature referred to by the Examiner is formed of two components: the burner 24 and the SiC tube 26. Combustion only takes place in the burner 24. The SiC tube 26 is only a discharge conduit and is not acting as a combustor. These are two distinct components are attached to each other by an interface.

The "step" referred to by the Examiner is designed to facilitate connection of the two components. It does not generate a uniform temperature distribution along the wall of the SiC

tube 26. The "step" referred to by the examiner exists outside the burner 24 and therefore cannot alter the internal dynamics of combustion to achieve the end result of the expansion step and the present invention. In Kovacik, the mixture combusts in burner 24 before encountering any form of expansion of the flow channel. The interface between the burner 24 and the SiC tube 26 of the Kovacik device plays no part in the stabilisation of combustion in the burner 24, and certainly does not constitute an expansion step. The variation in the area of the interface also has no direct relation to the temperature distribution along the emitter.

There is no expansion step disclosed in the Kovacik publication. Even if the feature referred to by the Examiner were considered an expansion step (which we contend it is not), it exists outside the internal chamber where combustion occurs.

**Kovacik is not shown to disclose even temperature distribution**

The micro TPV generator described in amended claims 1 and 18 includes, among other things, an internal expansion step configured to generate a significantly even temperature distribution on an outer wall of the combustion chamber. The Office Action does not support the §102 rejection with any evidence or argument that the even temperature distribution is taught by Kovackik. Applicant is not given the opportunity to address real issues of patentability, and are not given enough information to assist with the identification of any clear issues for appeal. Hence, the Office Action fails to meet the initial burden of factually supporting a case of anticipation under MPEP 2131. Applicants submit there is no disclosure in Kovacik of an internal expansion step in an internal chamber where combustion occurs that can achieve an even temperature distribution.

**Kovacik is not shown to disclose an emitter formed as part of a chamber wall**

The micro TPV generator described in amended claim 18 includes, among other things, an emitter formed as part of said chamber wall. According to the Office Action, Kovacik's emitter (28) reads on the presently claimed emitter, and Kovacik's burner (24) and tube (26) read on the present claimed chamber. At page 3 of the Office Action, it is alleged that Kovacik's emitter (28) is formed as a part of the outer wall of the combustion chamber. Applicant disagrees. However, as depicted in Figure 3 of Kovacik, there is a significant space or void

between the emitter (28) and the burner (24) and/or tube (26). Accordingly, Kovacik fails to teach or suggest an emitter formed as part of a chamber wall, as presently claimed.

For at least the reasons provided above, Applicants submit that amended independent claims 1 and 18 are novel over Kovacik. Claims 13 and 14 are novel and by virtue of the dependency on amended claim 1. Withdrawal of this rejection is respectfully requested.

#### First Claim Rejection Under 35 USC §103

Claims 2-12 and 17 are rejected under 35 USC §103(a) as being unpatentable over Kovacik in view of U.S. Patent No. 6,786,716 ["Gardner"]. This rejection is traversed.

According to MPEP 2143.03, the test for obviousness requires that all claim elements must be considered in determining the patentability of that claim against the cited references. Applicants submit that the proposed combination of Kovacik and Gardner does not teach or suggest the presently claimed combination of elements.

As noted above, Kovacik does not disclose each and every element of amended independent claim 1. Gardner describes a microhotplate and catalyst, but does not teach or suggest an internal expansion step configured to generate a significantly even temperature distribution on an outer wall of the combustion chamber. Hence, Gardner fails to remedy the deficiencies of Kovacik with regard to base claim 1. Claims 2-12 and 17 are therefore nonobvious by virtue of their dependency from amended independent claim 1. Withdrawal of this rejection is respectfully requested.

#### Second Claim Rejection Under 35 USC §103

Claim 15 is rejected under 35 USC §103(a) as being unpatentable over Kovacik and Gardner and further in view of U.S. Patent No. 6,043,426 ["DePoy"]. This rejection is traversed.

According to MPEP 2143.03, the test for obviousness requires that all claim elements must be considered in determining the patentability of that claim against the cited references. Applicants submit that the proposed combination of Kovacik, Gardner, and DePoy does not teach or suggest the presently claimed combination of elements.

As noted above, the combination of Kovacik and Gardner does not disclose each and every element of amended independent claim 1. DePoy describes a thermophotovoltaic energy conversion semiconductor device, but does not teach or suggest an internal expansion step configured to generate a significantly even temperature distribution on an outer wall of the combustion chamber. Hence, DePoy fails to remedy the deficiencies of Kovacik and Gardner with regard to base claim 1. Claim 15 is therefore nonobvious by virtue of its dependency from amended independent claim 1. Withdrawal of this rejection is respectfully requested.

Third Claim Rejection Under 35 USC §103

Claim 16 is rejected under 35 USC §103(a) as being unpatentable over Kovacik and Gardner and further in view of U.S. Patent No. 5,512,108 ["Noreen"]. Claim 16 is canceled. Withdrawal of this rejection is respectfully requested.

**CONCLUSION**

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

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